Statement of
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Before the Senate Committee on Agriculture, Nutrition and Forestry
Regarding H.R. 1904—the Healthy Forests Restoration Act of 2003
26 June 2003

Mr. Chairman, and members of the Committee, thank you for the opportunity to testify today on fire science and ecology and HR 1904, the "Healthy Forests Restoration Act of 2003".
I am Norman L. Christensen, Jr., Professor of Ecology and Founding Dean of the Nicholas School of the Environment and Earth Sciences at Duke University. For over thirty years, I have studied, written widely on and served on numerous advisory panels on the ecology and management implications of disturbance, especially fire, and the dynamics of forests across the United States.

Many, though by no means all, western forests are in an unhealthy state with respect to flammable fuels and risk of catastrophic fires. The scientific community is in agreement that action is indeed warranted and necessary in particular regions and forest types. I support the *intent* of HR 1904 to protect "communities, watersheds and ... at risk lands from catastrophic wildfire," but the bill can and should be improved in five specific ways.

1. *Much forested land is included in HR 1904 for possible hazardous fuel reduction (i.e., condition class 2 or 3, General Technical Report RMRS-87) that is not in an unhealthy state relative to fire risk. To ensure limited resources are directed to areas of greatest need, legislation can and should be more specific about which forests have been altered by fire suppression and past land use.* The greatest departure from historical conditions has occurred in forests with natural fire regimes typified by high (<35 years) and mixed frequency (35-100 years) fires (RMRS-87 Fire Regime Types I, II, and III). Important among these forests are semi-arid ponderosa pine types of the Southwest, Intermountain Region and eastern Cascades, as well as some dryer-phase mixed conifer forests in parts of the Sierra Nevada and Oregon. There is general agreement that fuel reduction—by prescribed fire or mechanical thinning—is needed in many of these forests. As is pointed out in RMRS-87, many western forests (Fire Regime Types IV and V) classified as Condition Class 2 or 3, including the array of hemlock- and fir-dominated forests of the western Cascades and lodgepole pine forests throughout the region, naturally experience fire at very long intervals (>200 years) and are not in need of restoration or remedial action. Indeed, actions in these forests will likely have contrary consequences.
2. *HR 1904 provides virtually no guidelines for "hazardous fuel reduction." Although "one-size-fits-all" prescriptions are not desirable, the focus must be on reducing those fuels most important to ignition and spread of wildfire.* They are, in order of importance, ground fuels and fine woody debris, "ladder" fuels that carry fires into the canopy, and smaller trees where densities are judged to be abnormally high. Where possible, prescribed fire is preferred economically and ecologically to mechanical thinning. "Big, old" trees should be retained because they are resistant to fire, maintain favorable moisture conditions on the forest floor, provide critical habitat and maintain key ecosystem functions. "Big, old" can and should be defined relative to the stature of particular forests.

3. *HR 1904 can and should be clearer regarding priorities for hazardous fuel reductions. Highest priority should be given to the wildland-urban interface ("interface communities") where forest conditions present the greatest risk to human life and property, and the threats to ecological processes of restoration activities are lowest.* Restoration activities outside so-called "community protection zones" are a lower priority and should be undertaken in a deliberate fashion based on a landscape-scale understanding of fire spread and its ecological consequences.

4. *HR 1904 can and should be much clearer about desired outcomes. Forest management is at its core "change management."* Hazardous fuel reduction cannot be about producing fire-proof forests—that is not possible; rather, our goal should be to restore conditions that will produce acceptable patterns of future change—i.e., conditions under which we can prescribe and manage the fires we want and extinguish effectively those we do not. Reference conditions for fuel restoration should be based on our understanding of natural patterns of fire behavior and likely patterns of forest change following treatments.

5. *The limited support for monitoring and research in HR 1904 and the proposed changes in NEPA (National Environmental Policy Act) rules (e.g., omission of consideration of alternatives) will undermine the opportunity to bring the best science to this important challenge.* Wherever we act we must do so understanding that we have much to learn. We must take advantage of this opportunity to create a program of continuous learning and improvement, i.e., adaptive management. Healthy forest legislation should require and adequately fund an integrated program of monitoring, research and adaptive management. In high priority areas (i.e., where human life and property are at risk) the streamlined NEPA procedures proposed in HR 1904 may be appropriate; the need to act may take precedence over deliberative processes in these situations. However, not considering alternatives from among management options is the scientific equivalent of running an experiment with only one treatment and no controls; such streamlining is likely to limit the input of new information and diminish public confidence in management actions. Away from the most urgent circumstances, abbreviated NEPA procedures are neither necessary nor helpful.

I thank the Chairman and the Committee for this opportunity to address these important issues.

Here follows more detailed explanation and support for these points. I have also appended an essay that provides an historical perspective on forest health and fire written by me for the January 2003 issue of the Pacific Forest Trust magazine (Appendix 1).

1. Much forested land is included in HR 1904 for potential restoration that is not in an unhealthy state relative to fire risk. To ensure limited resources are directed to areas of greatest need, legislation can and should be more specific about which forests have been altered by fire suppression and past land use.

HR 1904 (Title I) focuses attention on forests in fuel Condition Classes 2 or 3 as defined in USDA Forest Service General Technical Report RMRS-87. However, that report makes clear that catastrophic fire risk is largely confined to that sub-set of such forests that naturally experience low frequency (<35 years)/low severity, low frequency/high severity, and mid-frequency (35-100 years)/mixed severity fire regimes (Fire Regime Types I, II and III, respectively). Semi-arid ponderosa pine types of the Southwest, Intermountain Region and eastern Cascades, as well as some dryer-phase mixed-conifer forests in parts of the Sierra

Nevada and Oregon are among these forest types. There is consensus among fire scientists that hazardous fuel reduction is indicated for many of these forests, although prescribed fire may be sufficient to achieve such reduction in many cases.

There is little evidence that management practices over the past century have altered fire risk in forests with mid-frequency/stand replacement (Type IV) or low frequency/stand replacement (Type V) fire regimes (RMRS-87). Such forests include the array of hemlock- and fir-dominated forests of the western Cascades and lodgepole pine forests throughout the region. Fuel conditions in these forest types are not outside the range of natural variability. Furthermore, fuel manipulations here will likely have adverse ecological consequences and could even increase the likelihood of fire in these forests by altering moisture conditions and stand structure.

2. HR 1904 provides virtually no guidelines for "hazardous fuel reduction." Although "one-size-fits-all" prescriptions are not desirable, the focus must be on reducing those fuels most important to ignition and spread of wildfire.

Although HR 1904 focuses primarily on "hazardous fuel reduction" to reduce the risk of catastrophic wildfire, this phrase is poorly defined with no guidelines for implementation. There is no question that one-size-fits-all approaches are not advisable and that fuel restoration projects must be tailored to the conditions that are characteristic of particular forest types and historical situations. Nevertheless, more specific guidelines can and should be included in the legislation that will ensure that "hazardous fuel reduction" is actually achieved. Such guidelines are particularly important where competing pressures or incentives (e.g., biomass for fuel or commercial harvest of thinned material) could produce contrary outcomes.

Hazardous fuels are, in order of importance, ground fuels and fine woody debris, "ladder" fuels that carry fires into the canopy and smaller trees where densities are judged to be abnormally high. Where possible, prescribed fire is preferred to mechanical thinning for both economic and ecological reasons. However, risks presented by human habitation and abnormal fuel conditions limit the use of prescribed fire in many areas. As Wallace Covington (Northern Arizona University) and others have argued, where mechanical treatment is employed, it should focus on priorities described above to restore forests to explicitly described "reference conditions" based on management objectives.[1] In areas outside the wildland urban interface pre-settlement fuel loads are an appropriate point of reference. Within interface areas, other reference conditions might be appropriate.

There is agreement among fire scientists that "big, old" trees should be retained in addition to sufficient larger, younger trees to produce appropriate reference conditions. I use the word "old" here to refer to trees established before the period of management-caused fire exclusion. Tree size, i.e., "big", should be determined based on the scale of the forest. For example, in smaller stature ponderosa pine forests of the Four Corners or Colorado Front Range a ten-inch diameter tree might be well over 100-years old and considered big. However, in the more productive

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[1] "Without solid scientific knowledge of reference conditions and clear objectives for desired resource uses and ecosystem conditions, ecological restoration degenerates into ill informed speculation, subjective judgment, bias, ideology, and personal policy preferences." *Historical and anticipated changes in forest ecosystems of the Inland West of the United States*." Covington et al. 1994. *See also* Covington, W. W., Niering W., E. Starkley, and J. Walker. 1999. *Ecosystem restoration and management: scientific principles and concepts*. Book chapter in the Ecological Stewardship: A Common Reference for Ecosystem Management Reference. Elsevier Science Ltd.:599-617

mixed conifer forests of the central Cascades and Sierra Nevada, trees can grow to diameters of 24 inches in 50 years; in these large-stature forests the invasion of such trees (such as shade tolerant firs and incense cedar) has created "ladder" fuels that may require thinning to restore reference conditions.

Why isn't it true that "the more wood removed, the better"? Why should "big, old" trees be retained? First, larger-diameter woody materials do not pose a significant threat for wildfire ignition or spread. It is largely the finer fuels (a few inches and less in diameter) that carry fire. More important, large, old trees actually provide protection from fire spread because they are resistant to fire and their shade maintains favorable moisture conditions in the understory fuels. Too much thinning of the forest canopy can produce more rapid drying of such fuels and, thereby, more frequent and severe wildfire risk. Furthermore, big, old trees provide critical habitat and maintain key ecosystem functions.

3. HR 1904 can and should be clearer regarding priorities for hazardous fuel reductions. Highest priority should be given to the wildland-urban interface ("Interface communities") where forest conditions present the greatest risk to human life and property, and the threat to ecological processes of restoration activities are lowest. The unhealthy forest conditions of concern in HR 1904 are the product of nearly a century of fire suppression, often coupled to other human-caused disturbances such as over-grazing and logging. Restoration of forest health must be seen as a long-term process and commitment, and priorities for treatment should be assigned to those areas where human life and property are at greatest risk. Although we have much to learn regarding the effects of short- and long-term impacts of fuel reduction projects on ecosystem processes and species habitats, such concerns are generally less important in the wildland-urban interface.

Does this mean that hazardous fuel reduction should not be undertaken outside interface zones? No, but restoration programs in such areas should be undertaken with the understanding that we have much to learn about their impacts on the systems we wish to protect. We need to explore alternatives for deploying restoration treatments across landscapes in ways that effectively manage costs as well as possible adverse ecological impacts and minimize fire spread. We need to understand better the longer-term impacts of fuel reduction on hydrologic processes, biodiversity and fire risk.

4. HR 1904 can and should be much clearer about desired outcomes. Forest management is at its core "change management." It was most certainly not the intent of past forest managers to create unhealthy forest conditions; by protecting forests from fire, they were convinced they were preserving forest health. What they did not of course understand was that many forests, when so protected, undergo changes that make them *more* flammable and that natural fires in such forests are actually critical to their long-term sustainability. Hazardous fuel reduction cannot be about producing fireproof forests, that is not possible; rather, our goal should be to restore conditions that will produce acceptable patterns of future change—i.e., conditions under which we can prescribe and manage the fires we want and extinguish effectively those we do not. Reference conditions for fuel restoration should be based on our understanding of natural patterns of fire behavior and likely patterns of forest change following treatments.

In most forests, thinning of fuels will, in the short term, produce less flammable conditions. Improper or tardy disposal of thinning slash will, however, will have opposite short-term consequences. The fire risks that exist in the medium and long term will depend on subsequent

management and patterns of forest change. Over-thinning of some forest canopies can open them to rapid invasion by shrubs and smaller trees, erasing the restoration benefits in a few short years. Without light surface fires or other interventions to keep fuels at bay, treated areas will soon pose a wildfire threat. Thus, HR 1904 should mandate that hazardous fuel reduction programs be accompanied by a long-term management plan.

It is important to note that the last century's forest managers who were bent on preventing all fires were acting based on the values and scientific information available at the time. Rather than being hyper-critical with the benefit of our informed hindsight, we must understand that our own knowledge of fire regimes and their effects, as well as the implications of the fuel restoration interventions we propose here, is far from complete; managers a decade or two from now may very likely understand these processes differently and recommend different approaches. Whatever management we propose, it should at the very least inform this process of learning.

5. The limited support for monitoring and research in HR 1904 and the proposed changes in NEPA (National Environmental Policy Act) rules (e.g., omission of consideration of alternatives) will undermine the opportunity to bring the best science to this important challenge. It is rarely, if ever, the case that our understanding of the natural resources we manage is even remotely complete; thus, virtually all management must be a learning or adaptive process. Although we are beginning to understand the dynamic character and role of fire in forests at the stand and landscape level—and we understand the need to intervene to correct unhealthy situations—we have much to learn about those dynamics and the variety of possible consequences of our interventions. There is, however, no acknowledgement of this need in HR 1904 aside from modest research funding under Title IV. This need far exceeds the support allocated here. Furthermore, it is advisable to outline a program of research, monitoring and adaptive management such as that proposed by scientists and managers at The Nature Conservancy and appended to this document (Appendix 2).

In high priority areas (i.e., where human life and property are at risk) the streamlined NEPA procedures prescribed in HR 1904, Title I, may be appropriate; the need to act may take precedence over deliberative processes in these situations. Furthermore, because of their proximity to communities and generally more heavily managed environments, they are more likely to be monitored and less likely to suffer adverse ecological impacts. This said, systematic consideration of management alternatives (as prescribed in NEPA) is advisable wherever possible. Not systematically considering management alternatives from among management options is the scientific equivalent of running an experiment with only one treatment and no controls; such streamlining is likely to limit the input of new information and diminish public confidence in management actions. Away from the most urgent circumstances, abbreviated NEPA procedures are neither necessary nor helpful.

Legislative Language

Option 1:

Section 102(e).

(1) Restoring Forest Health.— For projects authorized in subsections 102(a)(2)- (5), each hazardous fuel reduction project shall establish specific, measurable objectives for restoring forest health. For projects authorized is subjection 102(a)(1), these objectives should be considered where possible.

(A) These objectives shall be directed toward restoring ecological conditions within the historical range of natural variability.

(B) Categories of ecological restoration objectives should include, when appropriate:

i) reduction of unnatural and hazardous fuel loads;
ii) restoration of ecosystem distribution; structure, function and composition;
iii) reintroduction of fire as a natural process;
iv) protection and restoration of at-risk species, such as species listed as threatened or endangered under the Endangered Species Act, 16 U.S.C. §§ 1531 et. seq., and species designated as Forest Service sensitive species;
v) maintenance and/or improvement of water quality;
vi) detection and control of ecologically harmful non-native species;
vii) prevention of unnaturally severe native insect or disease epidemics.

(C) Where possible, objectives should be determined in a landscape context.

(2) Adaptive Management. – The Secretary shall monitor the accomplishment of the objectives in paragraph (1), issuing a report at least every five years that includes the following information: the monitoring results; an evaluation of progress towards specific objectives; and recommendations for modifications to the strategies, projects and management treatments. Projects approved following the issuance of the monitoring reports shall be consistent with any recommendations in the reports.

Option 2:

Section 102(e)

(1) Restoring Forest Health.— Forty percent of hazardous fuel reduction projects shall establish specific, measurable objectives for restoring forest health.

[rest is the same]

Appendix 2

The Need for A Thoughtful, Restoration-Based Approach to Hazardous Fuels Reduction: a program of adaptive management.

As a result of decades of fire suppression and other practices, many federal lands have accumulated unnaturally high fuel loads that, under certain conditions, can sustain wildfires of unprecedented size and intensity. Such fires can damage homes and businesses, as well as municipal water supplies, the ecological health of forested areas, and the long term natural resource values of public lands.

Action is necessary to address these threats. But this time, let's be smart. Management decisions must recognize the differences among ecosystems and fire regimes, while incorporating ecosystem dynamics, uncertainty, historical management, current conditions, and desired future conditions. Notwithstanding the efforts of the past few years, we still have insufficient knowledge and experience. No one type of management will be appropriate everywhere, and not all areas should be treated until we know the most effective ways to treat them. For this reason, the public's investment in hazard reduction and forest restoration should be done adaptively so we can learn as we go. At a minimum, management must be coupled with monitoring designed to evaluate the results and provide guidance for future management actions.

Inside the Wildland-Urban Interface, treatments should be driven by the need for hazard reduction, with attention to forest health restoration goals wherever possible. Outside the Wildland Urban Interface, decisions and management should be driven by long-term forest health restoration goals, and should incorporate adaptive management practices.